

NYSSA BIFLORA Walt.

A single seed belonging to this species was found. The genus appears in the mid-Cretaceous and becomes abundant in the late Tertiary, the fruits being very common in the lignites of Brandon, Vermont, from which Perkins has recorded no less than seventeen distinct species.

None of the foregoing species furnishes any very definite data in regard to the climate of Talbot times, all being wide-ranging forms in the existing flora. Thus the beech ranges from Nova Scotia to Florida, as do some species of grape. The pignut hickory ranges from Maine to Florida and Texas; the cypress from Delaware to Florida, and the black gum from New Jersey to Florida and Louisiana.

Judging from the range as above given, we would not expect the climate of this river swamp in Virginia to have been colder than obtains in like surroundings in New Jersey at the present day. Temperatures were probably higher, as they were undoubtedly more uniform than in the adjacent uplands, the species all indicating a low, close stand of timber, the gum and cypress being characteristic swamp forms, the vine a lover of low thickets, the beech and pignut, especially the former, also preferring deep, damp woods.

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REVIEWS

Burgess's Species and Variations of Biotian Asters*

Here is a notable work notably performed, and one which responds in full measure to a long insistent need. Of all the larger groups of flowering plants in our eastern flora not another one, perhaps, now that enlightenment has dawned in the realms of hawthorn and of violet, has so pressed upon the student its need of re-interpretation as the asters — plants full of allurements and delight to the hopeful beginner, to the systematist recondite

* Burgess, Edward Sandford. *Studies in the History and Variations of Asters. Part II. Species and Variations of Biotian Asters with Discussion of Variability in Aster.* Mem. Torrey Club 13: i-xv + 1-419. f. 1-108. 15 Mr 1906. Price \$3.00.

and intractable in almost hopeless degree. Doctor Gray's prolonged struggle with the genus gave a result which met the reasonable needs of a generation of botanists and disturbed not their peace of mind. But even Doctor Gray here bowed before his task. To a friend he wrote "If you hear of my breaking down utterly and being sent to an asylum you may lay it to *Aster*." To such a group of plants has Professor Burgess addressed himself, or, more properly, begun to address himself, in this preliminary volume of 419 pages wherein the two species forming the section *Biotia* of Doctor Gray's treatment are expanded to 81 species, 10 named varieties and about 250 lesser forms. Professor Burgess tells us that his investigations which have led to these results commenced twenty years ago and that the conclusions reached rest in part on field studies continued on the same colonies of plants over periods of as much as seven to ten years. No fault of hastiness, therefore, can be imputed to these conclusions; and in the general reasoning which leads up to them we have the judgments of a mind long trained as well in outdoors as in indoors botany on many of the questions stirring the present foreground of botanical discussion.

It is plain in these pages that the author has felt less the motive of completing a monograph than an impelling need, as a student, of rightly understanding, step by step, the objects of his study. A work so completed must perforce carry weight; an upheaval so destructive of long-established tenets, whether its refashioning be right or wrong, will offer to criticism a ready opportunity. The reproach of "species making" follows close upon an author who proposes any refinement of the grosser conceptions of a species which time has imbedded in our text-books and bedecked with a historical aureole. And yet, but for these same "species makers" what misguidance, what untruthfulness would crowd the pages of our manuals?

Here, in *Aster*, that old Biotian pair, *Aster macrophyllus* and *Aster corymbosus*, have stumbled along down the annals of our flora somehow upholding honored names but only to be at length revealed as gross masqueraders after all.

Professor Burgess is not at all subservient to any conventional

standard of what should be the badge and token of a species. What he conceives to be worthy of this mark is to him full of reality and distinction. And intermediate specimens, or a certain proportion of intermediates, are not allowed to break down what nature has built up with notable architecture if not always with assured security. He is unterrified by variations, undaunted by numbers of forms. If nature directs the way that way must be followed notwithstanding a lion in every path. Doctor Gray, it appears, took many a short cut, but did not altogether escape the lions after all. And it is not to be supposed that the later author has come off without scratch or scar. A critic unfamiliar with the subject matter of this treatment might charge the author with having missed the highways in the byways. But this, we are convinced, cannot at all truthfully be said. Neither can it be said that his cartography is in all respects so true that the traveler may not too confidently always consult his guideposts. The future can alone determine this. Here it may be said that the substantial soundness of the work we expect the future to confirm.

Species, varieties, forms are indeed crowded upon these pages at the risk or with the certainty of bewildering the superficial student; yet nature herself is bewildering, and are not nature's facts more to be regarded than that taxonomic jugglery which would make the outlines of these facts either by elision or by emphasis falsely legible to the inquiring mind? And these lesser forms, although insisted on, are not mantled with any great dignity of taxonomic import. They are fixed only by a loosely fitting English name and may be taken or left by the student as the tenor of his mind may guide.

And as for these new species, what of them? What of species in general? Are we to lose them altogether in some wide-sweeping and misty conception of the instability of all organic forms? Some modern utterances seem almost to bear this meaning. Some taxonomic work would seem to mark the discovery of a mysterious species-solvent capable of reducing the subject matter of genera into veritable mushes of abstraction. In the method of this new aster book we welcome an emphatic protest against such robbery of nature.

Species, whatever they may be or may not be, press themselves before us with some invincible individuality which is their sufficient proof. Imprisoned in definitions, shackled by authority, ridiculed, nevertheless, by due process of time, the repression falls aside. So we have seen in many an instance, so we see here.

And if in the ultimate reach of our philosophy its teaching should be that these species in their varied and varying forms exist by reason of an infinity which lies back of nature, which nature is ever seething to express, then may we wisely restrain our too ready disbelief in the numbers of species which a genus may spread before us.

But the individual, the final unit, having likewise its manifold forms of expression, a double complexity enters into the taxonomic problem which, in large groups of closely related forms no single study of a single mind can be expected wholly to resolve.

In this treatment of *Aster* it is fully possible that the species-net has in cases been too finely meshed to capture much more than the individual, and while we doubt not that many species of the group yet remain to be added, some now admitted may have to be withdrawn.

Some of these studies have had much to do with selected colonies of plants. The consistent behavior and organic distinction of such colonies viewed at close range might easily lead the systematist astray. As evidence of true specific segregation they may indeed be wholly deceptive. It is not difficult to conceive that such an assemblage might be founded from a single aberrant individual by a process of undisturbed inter-breeding by which the aberrancy had been established in the enlarging colony. This is variation protected by isolation, and the evidence of possibilities rather than of fixed results. Should the process of expansion early eliminate the factor of isolation the features of the localized colony should readily pass back into the parent type.

Here, if anywhere, the test of a mature species must be found — the non-transformability of its individuals or their immediate generations under any conditions of environment into the next most nearly related form of accredited specific rank. Intermediate forms, however, are not necessarily by any means to be taken

as establishing such transformation. The current ruling, more especially in vertebrate zoölogy, which, in view of such intermediates reduces to subspecies widely diverse organic forms may well be suspected of being artificial and of attaching a fictitious importance to the mere evidences of origin which chance, perhaps, has allowed to remain unobliterated. Some fault of logic surely enters into a doctrine by which living types possessing organic values of high distinction in their class are reduced to relatively low taxonomic rank. A study such as the one before us, by its conscientious method, its open-mindedness, its enlightening results is a telling protest against the conventional, the artificial, the easy in taxonomic work.

Illustrations are indispensable to these pages and are well and effectively supplied. The unshaded heliotype plates, mostly of entire plants, are delicately true and bear touched into their outlines something indefinable which recalls instantly the individuality of the living plant. The many cuts scattered through the context are mostly by the author's own hand and add a guiding value which well justifies the evident care in bringing out essential points which has been bestowed on them.

The student of *Aster* may now take courage. It is the promise of this volume that the old hopeless search for real asters among those ghosts and figments of systematic botany — inclusive species — may presently remain to us only a doleful memory.

E. P. BICKNELL.

Winton's Microscopy of Vegetable Foods*

The author prefaces his work with a brief discussion of the apparatus, reagents, preparation of material for examination, and the histology and morphology of vegetable organs. The discussion in which the reader is especially interested is divided into nine parts as follows: 1. Grain: its products and impurities. 2. Oil seed and oil cakes. 3. Legumes. 4. Nuts. 5. Fruits and fruit products. 6. Vegetables. 7. Alkaloidal products and their substitutes. 8. Spices and condiments. 9. Commercial starches. The work contains a glossary and index.

*Winton, A. L. *The Microscopy of Vegetable Foods*, with special reference to the detection of adulteration and the diagnosis of mixtures. 8vo. i-xvi + 1-701. *f.* 1-589. New York, John Wiley & Sons. 1906. Price \$7.50.